

CLAIMS

We claim:

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1. A computer system comprising one or more central processing units and one or more memories, the system further comprising:

5 one or more sensors that sense one or more characteristics of a user and converts the characteristics into a first digital representation that is stored in one or more of the memories, the first digital representation having one or more subcharacteristics, the subcharacteristics being invariant over time, insensitive to common sensing artifacts, and capable of being repeatably extracted;

10 a distortion process that selectably distorts the first digital representation into a distorted digital representation by distorting at least one of the subcharacteristics, the distortion process being repeatable; and

a comparison process that compares one or more sets of the distorted subcharacteristics to one or more stored sets of distorted subcharacteristics to determine the identity of the user.

15 2. A system, as in claim 1, where the characteristics include any one or more of the following: a fingerprint, a face, a hand, an iris of an eye, a pattern of subdermal blood vessels, a spoken phrase, and a signature.

3. A system, as in claim 1, where the subcharacteristics include any one or more of the following:
a complete biometric, a partial biometric, a feature, a feature position, a feature property, a
relation between two or more features, a subregion of an image.
4. A system, as in claim 1, where the distortion is non-invertible.
- 5 5. A system, as in claim 4, where the distortion is applied to a orthogonal Cartesian grid
partitioning of the first digital representation.
6. A system, as in claim 4, where the distortion is applied to a circular polar-coordinate grid
partitioning of the first digital representation.
7. A system, as in claim 4, where the distortion process is a geometric distortion of the first
10 digital representation.
8. A system, as in claim 4, where the distortion process is a block scrambling of the first digital
representation.
9. A system, as in claim 1, where the first digital representation is quantized at a particular level.
10. A system, as in claim 9, where the distorted digital representation has a larger range relative
15 to the range of the first digital representation.

11. A system, as in claim 4, where the distortion process is applied within a canonical reference frame associated with the first digital representation.

12. A system, as in claim 11, where the characteristic being sensed is a fingerprint and the canonical reference frame is defined with its origin at the position of the core point and with one
5 axis passing through the position of the delta point.

13. A system, as in claim 11, where the characteristic being sensed is a face and the canonical reference frame is defined with its origin at the position of one eye and with one axis passing through the position of the other eye.

14. A system, as in claim 11, where a previously stored representation is aligned with the current
10 representation, the parameters of the alignment being used to derive a canonical reference frame.

15. A system, as in claim 1, where the comparison process provides either a unique recognition ID for the user corresponding to one of the people enrolled in the database or a non-recognition indication.

16. A system, as in claim 1, where the matching process takes as an additional input the proposed
15 ID of the user and verifies this identity by returning a yes or no answer.

17. A system, as in claim 1, where the second digital representation is discarded and replaced by a new second digital representation distorted by a new distorted process.

18. A system, as in claim 17, where the new second digital representation replaces the second digital representation in one or more of the following circumstances: a passage of time; invalid
5 access attempts, a customer request, a second user request, a physical user request.

19. A system, as in claim 1, where the sets of the distorted subcharacteristics correspond to one or more of the following: one or more minutiae in a fingerprint, a location of eyes, nose, and mouth in a face, a phase and contrast of optical texture in an iris, a set of formant frequencies and their time derivatives in a speech signal, and one or more joint lengths and widths in a hand.

10 20. A system, as in claim 1, where the distortion process is a geometric distortion of the first digital representation.

21. A system, as in claim 1, where the distortion process is a block scrambling of the first digital representation.

22. A method for generating a biometric comprising the steps of:

15 selectably distorting a first digital representation of one or more biometrics into a distorted digital representation by distorting at least one subcharacteristic of the biometric, the distortion process being repeatable; and

comparing one or more sets of the distorted subcharacteristics to one or more stored sets of distorted subcharacteristics, distorted by the distortion process, to determine the identity of a user.

23. A system for generating a biometric comprising:

5 means for selectably distorting a first digital representation of one or more biometrics into a distorted digital representation by distorting at least one subcharacteristic of the biometric, the distortion process being repeatable; and

means for comparing one or more sets of the distorted subcharacteristics to one or more stored sets of distorted subcharacteristics, distorted by the distortion process, to determine the identity of
10 a user.

24. A computer program product that executes the following steps:

selectably distorting a first digital representation of one or more biometrics into a distorted digital representation by distorting at least one subcharacteristic of the biometric, the distortion process being repeatable; and

comparing one or more sets of the distorted subcharacteristics, distorted by the distortion factor.

1. The first step is to identify the problem. This involves understanding the current situation, identifying the problem, and determining the scope of the problem.